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0 Introduction

While Arabic is well known for its gutturals, and there is plenty of discussion in the literature of back consonants and backing in Arabic from both phonological and phonetic perspectives, there is much less discussion of gutturals, particularly emphatics, in other Semitic languages.

This paper takes as a case study three language varieties of the south-west Arabian Peninsula (SWAP) area, presenting a comparative analysis of the interaction of two articulatory settings which may be considered ‘back’: pharyngealization and glottalization. While ‘pharyngeal’ and ‘glottal’ are terms relating to areas of the vocal tract which are adjacent, and both in a sense ‘back’, they are not necessarily related categories in languages’ sound systems. The focus in this paper is on phonological systems, and the interaction between the two apparently unrelated processes of pharyngealization and glottalization.

Pharyngealization is a secondary articulation involving a resonance contrast, i.e. a contrast of typically vocalic qualities, which may spread into surrounding vowels and even consonants. The pharyngealized segments investigated in this paper are the emphatic consonants. Under discussion, therefore, is ‘pharyngealization’ both as a phonemic category and as a phonological process. As a resonance contrast, pharyngealization in Semitic languages is generally said to be characterized by articulatory backing of the tongue to reduce the pharyngeal chamber, resulting in an auditory quality of ‘darkness’ which contrasts with non-pharyngealized ‘light’ sounds.

Glottalization, on the other hand, is the imposition of an articulation involving narrowing or closure of the glottis, the space between the vocal folds. This may manifest itself as creaky voice, a form of laryngealization created through tensing of the vocal folds, which is more typically a secondary (contrastive) articulation of sonorants in some languages. Another type (or function) of glottalization is a laryngeal, or phonatory, contrast which sits in opposition to voicedness, on the one hand, or aspiration, on the other. This is seen, for instance, in Ethio-Semitic languages, which have a type of glottalized obstruent known as ejective, which contrasts with voiceless aspirated and voiced obstruents, e.g. *t'*, *t*, *d*, respectively.

The ejectives of Ethio-Semitic languages are cognate with the emphatics of Arabic and the Modern South Arabian languages. Since, as already noted, emphatics may be pharyngealized, it is instructive to investigate interactions between pharyngealization and glottalization, particularly since these two different types of articulation seem to have very different functions within sound systems of languages more broadly. That is, if glottalization functions as a laryngeal contrast, and pharyngealization as a resonance contrast, what is the relationship between pharyngealized emphatics and glottalized emphatics? And in what way does pharyngealization interact with glottalization?

A look at the languages of the south-west Arabian Peninsula (SWAP) may help to provide an answer to such questions. In this region are languages in which both glottalization and pharyngealization are phonemic (e.g. Modern South Arabian), and in which both glottalization and pharyngealization result in allophonic variation (e.g. Ṣan‘āni Arabic). The languages taken as a case study for the purposes of this paper are spoken in Yemen and Oman. We begin with a presentation and discussion of relevant data from the dialect of Arabic spoken in Ṣan‘ā, and compare this with data from a dialect of Mehri spoken in eastern Yemen, and a dialect of Mehri spoken predominantly in south-western Oman.

As a starting point, we present some background on the articulation of Arabic pharyngealized emphatics, in Section 1. Section 2 begins with a discussion of ‘back’ settings in Ṣan‘āni Arabic, the furthest westward of the language varieties under investigation, and then proceeds to a discussion of glottalization and how this is manifested in Ṣan‘āni. In Section 3, we look at the Mahriyōt dialect of Mehri, discussing ‘back’ settings first, and then glottalization. Finally, in Section 4 we look at the most easterly of the three language varieties, with an analysis of ‘backing’ and then glottalization in the Mehreyyet dialect of Mehri.

Figure 1, below, is a map of the region.

Figure 1 The SWAP area (with Yemen highlighted)¹



1 Emphatics as backing: Arabic

Most researchers who have performed articulatory investigations of Arabic emphatics – for various dialects – report that the secondary constriction is in the upper pharynx. Instrumental studies have shown that the articulation of emphatics involves moving the tongue dorsum back towards the upper pharynx, as the secondary articulation, i.e. simultaneously with the primary articulation (e.g. a coronal gesture). Studies have shown that the upper pharyngeal wall is not actively involved in the articulation of emphatics, and that the constriction is achieved only through the retraction of the tongue dorsum.² There is an ongoing debate over whether this should be termed ‘pharyngealization’ or ‘uvularization’,³ although studies typically report that emphatics have greatest pharyngeal constriction at the upper pharynx, across from the second cervical vertebra,⁴ which have led many to argue for the term ‘uvularization’, at least in articulatory terms. There are studies which have also shown that the larynx may be raised concomitantly with tongue root retraction against the front of the epiglottis,⁵ thereby further reducing the volume of the pharyngeal cavity. Also typically observed is sulcalization (concavity) of the tongue body in the palatal region, and a slight retraction⁶ of the tongue tip.

Lastly, in many dialects of Arabic there is either a degree of lip protrusion evident,⁷ or at the very least a contrast between spread-lip position for non-emphatics and neutral lip position for emphatics.⁸ In some varieties of Arabic the production of emphatics involves lip protrusion / rounding which has become a systematic part of the emphatic sound. This is the case, for instance, in Šan‘āni Arabic,⁹ as discussed below, and in southern (*gilit*) Iraqi Arabic, among other dialects.¹⁰ This

may be more accurately viewed as labio-velarization, since the combined effect of lip protrusion / rounding and tongue dorsum backing into the upper pharynx creates an auditory effect like that of the labio-velar vowel *u*. This labio-velarization is also a ‘backing’ process and thus may act in tandem with pharyngealization, although both may have slightly different effects in different contexts.¹¹

This is a brief summary and outline of most of the major findings reported in articulatory studies of emphatics. Some of the results above are a little generalized, and this is not a comprehensive literature review. However, it is important to note that while we have mentioned here typical results obtained in such studies, there is some generalization. As noted by Khattab et al., ‘speakers have a range of articulatory strategies at their disposal, including how high in the pharynx to create a constriction.’¹² They go on to note that there appear to be several factors influencing the exact articulatory correlates of ‘emphatic’, including dialect, phonological environment, gender and possibly other social variables. In sum, however, the majority of the studies show a backing of the tongue towards the upper pharyngeal wall, and sulcalization of the tongue dorsum, in addition to lip protrusion (or lack of lip spreading) and concomitant jaw-lowering. Effectively, this results in minimization of the pharyngeal cavity and comparative enlarging of the oral cavity; crucially, this is in opposition to the corresponding non-emphatics, in which the pharyngeal cavity is possibly enlarged through fronting of the tongue dorsum, and the oral cavity is comparatively minimized by a greater part of the tongue dorsum.

To conclude this section, it may be phonetically misleading – or at least, over-simplistic – to term the phenomenon simply ‘pharyngealization’ or ‘uvularization’, since ‘emphatic’ has a number of co-occurring articulatory correlates that combine to create an auditory (i.e. perceptual) effect that may be termed ‘dark’ or ‘flat’ (in timbre), and which, crucially, is in opposition to the timbre of non-emphatics.¹³ However, in this paper we adopt the term ‘pharyngealization’ as one which has a broader sense that may be more appropriate as reference to a phonological category,¹⁴ while acknowledging that the term ‘uvularization’ may be more appropriate to refer to the dominant articulatory correlate.¹⁵

2 Yemen: Ṣan‘āni Arabic

The Arabic dialect of the Yemeni capital Ṣan‘ā is spoken by around 100,000 speakers in the area today, primarily the original inhabitants of the Old City of Ṣan‘ā and its traditional suburbs.¹⁶ It is an Arabian dialect (e.g. **q > g*, as per Table 1, below) which, in addition to having backing processes involving both pharyngealization (/ uvularization) and labio-velarization, manifests a pre-pausal process of glottalization in which voiceless emphatics pattern alongside voiced obstruents.

The consonant system of Ṣan‘āni Arabic (SA) is shown in Table 1, below. Points of note are as follows. Firstly, **q* is *g* in all contexts, even in religious terms, e.g. *al-gur‘ān* ‘the Qur‘ān’. The voiceless non-emphatic stops *t k* are aspirated; the voiceless emphatic *ṭ* is unaspirated; this is discussed further in Section 2.2, below, as it plays an important part in pre-pausal glottalization.

Table 1 Ṣan‘āni Arabic consonant system

		labial	dental	alveolar	palato- alveolar	palatal	velar	pharyngeal	glottal
PLOSIVE	voiced	b		d			g ¹⁷		
	voiceless			t			k		ʔ
	emphatic			ṭ					
affricate					j ¹⁸				

FRICATIVE	voiced		ḍ	z		ġ	ʿ	
	voiceless	f	ṭ	s	š	ḥ	ḥ	h
	emphatic		ḍ̣	ṣ				
nasal		m		n				
lateral				l				
rhotic				r				
glide		w ¹⁹				y		

2.1 Backing

In common with the majority of Arabic dialects,²⁰ the emphatics in SA are realized with secondary pharyngealization / uvularization. However, SA emphatics are, additionally, labio-velarized.²¹ Thus, emphatics are produced with concomitant pharyngeal constriction and lip-protrusion and rounding. While there are other articulatory correlates, as discussed in Section 1, above, the active correlates are pharyngealization and labio-velarization, since these are the features that spread from the emphatic onto other segments, and which are thus phonologically relevant.

The SA data in (1), below, show how the emphatics trigger spreading of pharyngealization leftwards (regressively) and labialization rightwards (progressively). There is a conflict between the two backing processes of pharyngealization and labialization, and what we term ‘front’ environments, i.e. environments which are phonologically ‘palatal’.²²

- (1)
- | | | | |
|----|---------------|--------------------|----------------------------|
| a. | [mistadi:rih] | <i>mistadīrih</i> | ‘round f.s.’ ²³ |
| | [dʒowzih] | <i>jawzih</i> | ‘coconut’ |
| b. | [moʃtaʃi:lōh] | <i>mistaʃīlih</i> | ‘elongated f.s.’ |
| | [moʃxaʃaʃi:n] | <i>miṭhaʃʃaʃīn</i> | ‘specialised m.pl.’ |
| | [ʔa:goh] | <i>ʔāgih</i> | ‘window’ |
| | [ʔawi:lōh] | <i>ʔawīlih</i> | ‘long f.s.’ |
| c. | [koreh] | <i>kurih</i> | ‘ball’ |

The data in (1a) show that the final *tāʾ marbūʔa*, the feminine singular / unit noun morpheme *-ih*,²⁴ is realized as [ih] following the non-emphatic coronal *z*, and following *r* which is itself preceded by *ī*. By contrast, as in (1b), this morpheme is realized as [ōh] when the word contains an emphatic, even where there is an intervening *ī* and non-emphatic coronals. The data in (1b) also show how ‘emphaticness’ spreads leftwards into coronal obstruents which are assumed to be lexically non-emphatic. Thus, it appears to be the pharyngealization which is spreading leftwards and the labialization which is spreading rightwards.²⁵

Also interesting is the last piece of data, (1c), in which the *tāʾ marbūʔa* is neither [ih] nor [ōh], but clearly [eh]. This shows that the labialization is triggered by the presence of an emphatic, but not by a preceding labial vowel (that is, [u]), and that *r* (compare *mistadīrih* in 1a) is itself not ‘front’, yet it does not behave like an emphatic. This provides further evidence for palatalization (*imāla*) as an active process in contrast to pharyngealization and labialization. Note that the *tāʾ marbūʔa* is realized as a slightly lower than central vowel, [e], presumably under the influence of the slight backing of *r*.²⁶ Further, the

vowel in the first syllable of *mistaṭīlih* and *mitxaṣṣaṣīn* in (1b) is clearly variant, but here the [o] arises from its directly following a labial, but in a non-front context. Thus, the labio-velar quality is spreading rightwards from the labial and is not blocked by the leftward spread of the palatalization from a non-emphatic coronal, which is what is evident in *mistadīrih* in (1a).

The labial (labio-velar) colouring of a vowel immediately following a velar is generally accompanied by labio-velarization of the preceding velar itself, e.g. *ku* > *k^wu*.²⁷ Further, both labials and velars are labio-velarized following *u* and *w* non-finally, e.g. *ub...* > *ub^w...* and *wb...* > *wb^w...* This is exemplified in (2), below.²⁸ The degree of this labio-velarization varies according to word prominence within the utterance as well as to stress of the triggering vowel. Geminates also undergo stronger labio-velarization than singletons.

(2)

a.	<i>u</i> [mm ^w] <i>i</i>	<i>ummī</i>	‘my mother’
	<i>ḍu</i> [bb ^w] <i>i</i>	<i>ḍubbī</i>	‘fly’
	<i>tu</i> [ff ^w] <i>ay</i>	<i>tuffay</i>	‘extinguish f.s.!’
	<i>du</i> [kk ^w] <i>ān</i>	<i>dukkān</i>	‘shop’
	<i>šu</i> [gg ^w] <i>ih</i>	<i>šuggih</i>	‘apartment’
	<i>du</i> [xx ^w] <i>ān</i>	<i>duḥḥān</i>	‘smoke’
	<i>yaw</i> [m ^w] <i>ī</i>	<i>yawmī</i>	‘daily’
	<i>u</i> [k ^w] <i>āl</i>	<i>ukāl</i>	‘food’
b.	<i>mal</i> [g ^w] <i>ūs</i>	<i>malgūs</i>	‘stung’
	[k ^w] <i>ull</i>	<i>kull</i>	‘all’
	<i>yur</i> [g ^w] <i>ud</i>	<i>yurgud</i>	‘he sleeps’
	[g ^w] <i>ult</i>	<i>gult</i>	‘I/you m.s. said’

The data in (2a) exemplify labio-velarization of labials and velars following a labio-velar vowel or glide (geminate, then singletons), while those in (2b) show labio-velarization of velars preceding a labio-velar vowel *u* / *ū*.

To sum up, we can see that a short high vowel may itself be labio-velarized by the presence of emphatics and labials, i.e. we find the *u* variant where otherwise *i* is realized. Further, the vocoids *u*, *ū*, *w* cause labio-velarization of dorsals (rightwards and leftwards) and labials (rightwards). Labio-velarization is therefore an active process in SA, interacting with pharyngealization to create a salient contrast between ‘back’ and ‘front’ domains.

In summary, the SA data in (1–2) exemplify that in SA there are three active processes that we term ‘resonance colouring’, i.e. pharyngealization, labio-velarization and palatalization. Pharyngealization and labio-velarization are both ‘backing’ processes that have effects across the word where they are triggered by the presence of an emphatic, and they work in opposition to palatalization. The processes may be seen, respectively, as *a*-colouring, *u*-colouring and *i*-colouring.²⁹ Therefore, emphatics in SA (indeed, in most dialects of Arabic) work as part of an overall system of resonance contrastivity.

However, there is a further relevant process in SA; emphatics also play a role in a process of pre-pausal glottalization, which is the topic of the next section.

2.2 Glottalization

Phonetic analysis of voiced and voiceless stops³⁰ in SA reveals that in non-final position, SA has voiced stops (*b d g*), a voiceless unaspirated stop (emphatic *ṭ*), and voiceless aspirated stops (non-emphatic *t* and *k*).³¹

The emphatic stop in SA is thus differentiated not only by its resonance contrast, i.e. by being pharyngealized, but additionally by being voiceless and unaspirated, in contrast with the non-emphatic voiced stops, and with the non-emphatic voiceless stops, which are aspirated. While this laryngeal contrast is not the dominant perceptual contrast of emphatics and

thus not its phonological function (see the data and discussion in Section 2.1 above, and note also that this laryngeal / aspiration contrast is evident only in the emphatic stop, and not in the other emphatics), it plays an important role in the patterning of emphatics, particularly vis à vis the pre-pausal process of glottalization. It is thus phonologically relevant, even though the dominant phonological role of emphatics is as part of a larger system of resonance contrasts.

There are various phenomena affecting final positions at both word and utterance levels in SA.³² Word-finally, voiced obstruents tend to devoice in many contexts, which has the effect of partially neutralizing the contrast between emphatics and non-emphatics. However, there is an additional process targeting most segment types in pre-pausal position, i.e. when they occur at the end of an utterance (utterance-final segments are thus also word-final and subject to the more widespread word-final processes). This process is pre-pausal glottalization, and it causes considerable glottalization of most segment types (alongside the devoicing just mentioned). The exact realization depends on the type of segment: generally, voiced obstruents and emphatics are devoiced and either pre-glottalized or, in the case of stops, realized as ejectives, while sonorant consonants tend to be pre-glottalized and devoiced, and vowels post-glottalized. By contrast, pre-pausal aspirated stops (*t* and *k*) are heavily aspirated and not glottalized.³³

Before elaborating on the details of SA pre-pausal glottalization and presenting some data, we outline here what we mean by the term ‘glottalization’. A glottalized sound is one which in some way or other involves glottal closure, i.e. a closure of the vocal folds, inside the larynx. Glottal closure on its own (the glottal stop) is a common phoneme in the world’s languages, and even in English is a common realization of coronal *t* in certain contexts, as in what is often thought of as a typical Cockney pronunciation of a word such as ‘butter’ [bʌʔə] – this replacement is generally called ‘glottaling’. When glottal closure doesn’t replace the primary gesture, but is made as a secondary gesture alongside the constriction elsewhere in the vocal tract, then the sound in question is glottalized (rather than glottaled). There are several types of sounds that are made with glottalization, since the latter may be thought of as a continuum (degree of stricture, timing) and since its effects may vary between obstruents and sonorants, and between voiced and voiceless sounds. With sonorants, the glottal closure may occur before the sonorant, in which case it is pre-glottalized, after the sonorant’s primary gesture, in which case it is post-glottalized, or it may be realized as creaky voice³⁴ on the sonorant. With voiced obstruents, glottalization is typically either realized as creaky voice, or the closure of the glottis may allow for glottalic airstream mechanism to be initiated, in which case an implosive consonant is produced.³⁵ With voiceless obstruents, glottalization often manifests itself via the glottalic airstream mechanism, producing an ejective.³⁶

In SA, pre-pausal glottalization affects all types of sounds, except aspirated stops (i.e. the non-emphatic voiceless stops) and voiceless pharyngeals and laryngeals. In utterance-final position, glottalization has the effects shown in the data in (3), below. (Secondary glottalization is notated by an apostrophe; where the consonant has been lenited to the point of apparent elision, and in the case of final vowels, glottal closure is notated by a glottal stop [ʔ]. The underdot is retained in the phonetic transcription in the case of emphatics, to denote pharyngealization).

(3)

a.	<i>dagī</i> [kʰ]	<i>dagīg</i>	‘flour’
	<i>mara</i> [kʰ]	<i>marag</i>	‘sauce’
	<i>bāri</i> [tʰ]	<i>bārid</i>	‘cold’
	<i>mbarga</i> [tʰ]	<i>mbargaṭ</i>	‘lumpy’
	<i>dajā</i> [ʃʰ]	<i>dajāj</i>	‘chicken’
	<i>ṣā</i> [ʃʰ]	<i>ṣāj</i>	‘frying pan’
	<i>kū</i> [pʰ]	<i>kūb</i>	‘cup’
b.	<i>bisbā</i> [ʰs]	<i>bisbās</i>	‘chilli pepper’
	<i>gumā</i> [ʰʃ]	<i>gumāš</i>	‘[piece of] cloth’
	<i>ṭalā</i> [ʰθ] ³⁷	<i>ṭalāt</i>	‘three’

	<i>laḏī</i> ['θ]	<i>laḏīd</i>	‘delicious’
	<i>bay</i> [ʔ]	<i>bayḏ</i>	‘eggs’
	<i>arb</i> [aʔ]	<i>arba</i> ‘	‘four’
	<i>nā</i> [ʔr]	<i>nār</i>	‘[gas] flame’
	<i>galī</i> [ʔ]	<i>galīl</i>	‘a little’
	<i>ṭahī</i> [ʔ]	<i>ṭahīn</i>	‘(coarse) flour’
c.	<i>yəḥm</i> [æ:ʔ]	<i>yəḥmā</i>	‘it m.s. is hot’
	<i>təšta</i> [jʔ]	<i>təštay</i>	‘you f.s. want’
	<i>zabād</i> [i:ʔ]	<i>zabāḏī</i>	‘yoghurt’

The data in (3a) exemplify that voiced and emphatic stops are generally released as ejectives in pre-pausal position.³⁸ It is evident from the data in (3a) is that there is near neutralization of the voiced and emphatic stops.³⁹ However, complete neutralization is avoided since a final emphatic (in this case *t*) triggers backing of a preceding vowel, while a vowel preceding a non-emphatic (in this case *d*) is not backed. It is therefore only among the fricatives, as in (3b), that true neutralization occurs in pre-pausal position (e.g. *ḏ* and *ṭ* are both pre-glottalized [ʔθ], and so on), and where a final glottalized consonant is elided and glottal replacement occurs (examples are given in (3) of glottal replacement of *ḏ*, ‘, *l*, *n*).

(3b) shows that the fricatives and sonorants in pre-pause position are pre-glottalized, and voiced consonants also devoiced. With the exception of the sibilants, coronal consonants in this context are subject to lenition. In this case, there is a glottal closure following the vowel, and the final fricative / sonorant barely audible or not at all. The gesture for the consonant may be made, but not audibly released, or it may be completely elided.

Final vowels are shown in (3c). Typically, a long vowel is ended abruptly and clearly by a glottal closure, i.e. post-glottalized. The glottal closure is preceded by a period of creak.⁴⁰

For the data in (3b–c), the pre-glottalized fricatives and sonorants, and the final vowels, it should be noted that all the examples above involve long vowels. This is discussed further presently, since not all pre-pausal fricatives, sonorants and vowels are regularly glottalized.

We therefore now move onto the non-occurrence of pre-pausal glottalization. There are a couple of contexts for non-application, the most salient of which is in the case of the voiceless aspirated stops (i.e. non-emphatic voiceless stops), *t* and *k*. In pre-pause position, these consonants are heavily aspirated and not glottalized, with the aspiration beginning before the closure of the stop, i.e. *t* and *k* are pre-aspirated in pause. We thus see the following:⁴¹

(4)	<i>l-ma</i> [w ^h t ^h]	<i>l-mawt</i>	‘death’
	<i>šaḏū</i> [w ^h t ^h]	<i>šaḏūt</i>	[spicy yoghurt dish]

This pre-aspiration of stops in pause position is particularly salient. Glottalization also most often fails to occur in another context, as shown in (5), below.

(5)						
a.	<i>laḥū</i> [h]	<i>laḥūh</i>	[kind of sour pancake]			
b.	<i>ḥub</i> [z]	<i>ḥubz</i>	‘bread’	cf. <i>fīr</i> [ʔ]	<i>fīrn</i>	‘oven’
	<i>ḥam</i> [s]	<i>ḥams</i>	‘five’	cf. <i>sam</i> [ʔ]	<i>samn</i>	‘ghee’
	<i>mil</i> [h]	<i>milḥ</i>	‘salt’			
c.	<i>rijli</i> [j]	<i>rijliš</i>	‘your leg(s)’			

	<i>mfarga</i> [ʃ]	<i>mfargaš</i>	‘lumpy’
	<i>jāhi</i> [z]	<i>jāhiz</i>	‘ready’
	<i>kwayyi</i> [s]	<i>kwayyis</i>	‘nice, fine’
	<i>aḥma</i> [r]	<i>aḥmar</i>	‘brown (of cooking bread)’
	<i>iṣḥagīhi</i> [n]	<i>iṣḥagīhin</i>	‘crush, grind f.s. them f.pl.’
d.	<i>kur</i> [a ^h]	<i>kurih</i>	‘ball’
	<i>mil’ag</i> [a ^h]	<i>mil’agih</i>	‘spoon’
	<i>tūm</i> [a ^h]	<i>tūmih</i>	‘[a piece of] garlic’

While glottalization may sometimes appear weaker, or occasionally even absent where expected, in the type of data in (3) above, significantly, where it fails to apply in (5) there are clear regularities. Firstly, as in (5a), glottalization does not apply to the voiceless pharyngeal *ħ*. (5b) also shows an example of a final *ħ*, but here in a consonant cluster. We showed in (3b) that a final voiced pharyngeal is replaced by a glottal stop (in *arba* ‘, ‘four’). Pre-glottalization also fails to apply to fricatives and sonorants in pause position in (5c), where the relevant consonant follows a short vowel; the pre-glottalized fricatives and sonorants in (3b), above, were all following a long vowel. Finally, in (5d), too, pre-glottalization fails to apply. This context is not just following a short vowel, but where the consonant is a voiceless laryngeal *h*, in these examples the feminine *tā’ marbūṭa*. The laryngeal is often not very salient (hence the superscript notation), but apparently phonologically present.

A final point of note here is that the data exemplified are from one speaker in particular. Glottalization is not completely invariant, but all the data given here is typical of this corpus,⁴² and of Ṣan‘āni Arabic in general.

We can summarize the SA data as follows. Pre-pausally, all voiced consonants are devoiced; voiced and emphatic stops and the affricate are released as ejectives; fricatives and sonorants following long vowels are pre-glottalized and non-sibilant coronals subject to lenition (to the point of elision); vowels are post-glottalized; with all glottalized segments, creak is evident before the glottal closure. The voiceless pharyngeal and laryngeal *ħ* and *h* are not subject to pre-pausal pre-glottalization, and neither, most often, are fricatives and sonorants following short vowels. Voiceless aspirated stops (*t* and *k*) are not glottalized, but heavily aspirated (and pre-aspirated) in pre-pausal position. Pre-pausal glottalization in SA thereby applies as follows:

VOICED AND EMPHATIC STOPS (including the affricate)

b d ɟ g j > devoiced and ejective
(creak on preceding vowel)

FRICATIVES following long vowel

f ɖ ɗ ʈ ʣ ʥ s š ʒ ħ > devoiced and pre-glottalized
(creak on preceding vowel; coronal non-sibilants often lenited)

SONORANTS following long vowel

m n l r > devoiced and pre-glottalized
(creak on preceding vowel; coronals often lenited)

LONG VOWELS

ā ī ū ay aw > post-glottalized
(with preceding creak)

Pre-pausal glottalization is not a phenomenon occurring arbitrarily in SA, however. The process is an areal feature, found in many parts of the SWAP region, including northern Yemen,⁴³ southern ‘Asīr (south-western Saudi Arabia),⁴⁴ and the area south of Wādī Ḥaḍramawt down to the coast (southern and eastern Yemen).⁴⁵ It also is a feature in at least some of the Modern South Arabian languages, from Yemen to Oman, and we posit that pre-pausal glottalization is a factor that has partly

influenced more recent descriptions of emphatics in these languages as ejectives and helped to fuel the debate over what exactly emphatics in these languages are.⁴⁶ Therefore, in the next two sections of this paper we move over to Mehri, to investigate back settings in two varieties, one of eastern Yemen and one of western Oman.

3 Yemen: Mahriyōt

Mehri is one of the six Modern South Arabian languages (MSAL), the others being Jibbālī (Šherēt), Soqōṭri, Ḥarsūsi, Hobyōt and Baṭḥari. It is spoken more widely than the other five MSAL: from Qishn on the coast of Yemen and across the eastern region into Dhofar, in western Oman, up into the southern periphery of central Saudi Arabia.⁴⁷ However, it is difficult to assess Mehri speaker numbers with much accuracy, since it is spoken across three countries and many Mahra either no longer speak Mehri or speak only limited Mehri. Numbers of speakers have been estimated at anything from 100,000 to 180,000,⁴⁸ the more conservative estimate of which is greater than the estimates for speakers of the other five MSAL combined. There are three major dialect groups of Mehri: western Yemeni Mehri; Mahriyōt (or eastern Yemeni Mehri), spoken mostly in Ḥawf, in the eastern Mahra province of Yemen, and just across the border into the western edge of Oman; Mehreyyet, or Omani Mehri, spoken in Dhofar, particularly around the mountains, although today down to Salalah on the coast, and up into southern Saudi Arabia.

In this section we discuss back settings in Mahriyōt. We present the consonantal system first, and then discuss emphatics and glottalization in the following sub-sections.

The consonantal system of Mahriyōt is presented in Table 2, below.⁴⁹

Table 2 Mahriyōt consonant system

		<i>labial</i>	<i>dental</i>	<i>alveolar</i>	<i>palato- alveolar</i>	<i>palatal</i>	<i>velar</i>	<i>uvular</i>	<i>pharyngeal</i>	<i>glottal</i>
PLOSIVE	voiced	b		d			(g) ⁵⁰			
	voiceless			t			k			ʔ
	emphatic			ṭ			ḵ			
affricate					j ⁵¹					
FRICATIVE	voiced		ḍ	z				ğ (~q)	ʕ	
	voiceless	f	ṯ	s	š			ħ	ħ	h
	emphatic		ṯ	ṣ	š ⁵²					
LATERAL	voiced			l						
	voiceless				ś					
	emphatic				ś ⁵³					
nasal		m		n						

rhotic		r	
glide	w		y

3.1 Backing

As can be seen from Table 2, above, Mahriyōt has six emphatics: *t k ʃ ʈ ʂ ʕ*. In the literature on MSAL, there has been considerable debate, if not much puzzlement, over the exact realization of the emphatics. Most of the earlier sources (works based on the Viennese expedition⁵⁴ and Bertram Thomas⁵⁵) describe the emphatics of MSAL as being similar to, but less salient than, those of Arabic. There is much inconsistency in their transcriptions,⁵⁶ which we see as evidence not only of the perhaps inevitable comparison with Arabic (and a consequent expectation that they might be similar), but also of emphatics being actually somewhat variant in certain aspects of production as well as cross-dialectally variant. There are indeed similarities with Arabic, in that MSAL emphatics are pharyngealized;⁵⁷ although this would seem to be less so than in neighbouring varieties of Arabic, MSAL emphatics clearly cause backing of surrounding vowels. Essentially, almost all the work on MSAL emphatics up until about 1970 held that they were similar to Arabic emphatics (i.e. pharyngealized).

However, most work from the 1970s has described MSAL emphatics as ejectives, which appears a fairly substantial, if not at first surprising, contradiction of the earlier body of work.

Emphatics in Jibbāli were described in the earliest European work on MSAL (Fresnel's 1838 paper) as being produced via 'une émission violente et subite' of air which is 'comprimé dans le larynx'.⁵⁸ It seems fairly clear that what Fresnel is describing is an ejective, rather than a solely pharyngealized, emphatic. This work was dismissed, and ejective realizations of MSAL emphatics not mentioned again until Johnstone presented in 1970⁵⁹ the findings from his fieldwork in Oman, and his conclusion that MSAL emphatics are glottalics (although he noted a weaker release than the ejectives of Ethio-Semitic languages such as Amharic).⁶⁰ Much of the work since then has described MSAL emphatics as (post-)glottalized / ejective.⁶¹ More recently, there is brief discussion of variation in the degree of glottalization, and it has been noted that this may depend not only on dialect but also on phonological context.⁶² Further, there has been recent discussion of glottalization being (increasingly) restricted to a sub-set of the emphatics.⁶³ These latter indications fit with the findings of our own recent work on Mehri emphatics,⁶⁴ that in addition to dialectal variation, the system of emphatics is mixed and that phonological context plays a large role. This is the topic of the remainder of this section, for Mahriyōt, as well as the next (on pre-pausal glottalization). Section 4, following, discusses Mehreyyet emphatics.

In Mahriyōt the emphatics pattern phonologically with pharyngeals, uvulars and *h* in occurring with 'backed' allophones of certain vowels.⁶⁵ In this way, following *h*, or an emphatic, pharyngeal or uvular, the long vowels *ē* and *ā* are realized as low and central to back ([a:] – [ɑ:]), while in all other environments *ē* is mid-front (around [e:]) and *ā* is between [ɛ:] and [æ:]. This results in the allomorphy in (6), below, for the feminine singular suffixes *-ēt* and *-ēta*.⁶⁶

(6)

a.	<i>farḥ</i> [a:] <i>t</i>	'happiness'	<i>kaśr</i> [e:] <i>t</i>	'naughtiness'
	<i>kaʃʃ</i> [a:] <i>t</i>	'story'	<i>ḥabz</i> [e:] <i>t</i>	'piece of bread'
	<i>faʃʃ</i> [a:] <i>t</i>	'silver'	<i>ṭabal</i> [e:] <i>t</i>	'metal box'
	<i>wark</i> [a:] <i>t</i>	'sheet, leaf'	<i>raḥb</i> [e:] <i>t</i>	'town'
b.	<i>mšawnah</i> [-a:] <i>ta</i>	'relax.FUT-FS'	<i>mšukf</i> [-e:] <i>ta</i>	'sleep.FUT-FS'
	<i>maštawḥ</i> [-a:] <i>ta</i>	'miss.FUT-FS'	<i>maḡtary</i> [-e:] <i>ta</i>	'speak.FUT-FS'

In (6a), the data show the nominal feminine suffix *-ēt* with the 'back' variant of the vowel after emphatic *ʃ*, *ʂ* and *k* and after pharyngeal *ḥ* (left-hand column), and with the 'front' variant of the vowel after *r*, *z*, *l* and *b* (right-hand column). In

(6b), uvular *ħ* and emphatic *ḳ* induce the ‘back’ variant of the verbal future feminine singular suffix *-ēta* (left), while *f* triggers the ‘front’ variant (right).

In the same environment (following *h*, emphatics, pharyngeals and uvulars), in most cases *ay* and *aw* occur where otherwise *ī* and *ū* would obtain, as exemplified in (7).⁶⁷

(7)

a.	<i>ba-ħħays</i>	‘with energy’		
	<i>ḳayt</i>	‘hot/pre-monsoon period’		
	<i>‘ayd</i>	‘sardine-like fish’		
	<i>ṣayd</i>	‘fish’		
	<i>ṣayja</i>	‘hut’		
b.	<i>ṣar‘ayt</i>	‘armpit smell’	<i>šabdīt</i>	‘liver’
	<i>bīṣayt</i>	‘egg’	<i>rēšīt</i>	‘snake’
	<i>hab‘ayt</i>	‘seven’	<i>ṭamnīt</i>	‘eight’
	<i>ṣalħayt</i>	‘fat f.s.’	<i>ħaṭmīt</i>	‘thin f.s.’
c.	<i>malħawt ~ malħōt</i>	‘salt, salt water’		
	<i>was‘awt</i>	‘it f. held’	<i>barwōt</i>	‘she gave birth’
	<i>aṣṭawt</i>	‘it f. hurts’		

In (7a), the data show examples of the diphthong *ay* occurring after pharyngeals (*‘* and *ħ*) and emphatics (e.g. *ḳ*, *ṣ* and *ṣ*). (7b) shows the feminine nominal, adjectival and numeral ending *-īt*, realized as *-ayt* after pharyngeal *‘* and *ħ* and emphatic *ṣ*. Lastly, (7c) shows the diphthong *aw* after pharyngeal *‘* and *ħ* and emphatic *ṭ*; this is less systematic, however, and variation occurs, as in *malħawt ~ malħōt*.

The conclusion is therefore that the emphatics in Mahriyōt are ‘back’. This fits with native-speaker descriptions that indicate that the emphatics are pharyngealized, e.g. Mahriyōt *ḳ* is articulated as *k* + *‘ayn*, and *ṭ* is the same as Arabic *ṭ*.⁶⁸

Importantly, of course, this does not exclude the possibility of glottalization. That is, pharyngealization and glottalization are not mutually exclusive – it is perfectly possible physiologically to produce a consonant which is both glottalized, even ejective, and pharyngealized, and it is not unattested cross-linguistically.⁶⁹ This is precisely what happens in certain conditions in Mehri, although these conditions vary cross-dialectally. The details and data in the following sub-section are therefore to be compared and contrasted with Section 4 (Mehreyyet).

3.2 Glottalization

As seen in Section 3.1, above, Mahriyōt emphatics are ‘back’; however, *ḳ* is additionally a glottalic (i.e. ejective) in all contexts. Glottalization is attested on other consonants, but this glottalization occurs only in a specific context, and is thus predictable.⁷⁰

Observe the data in (8), following (as above, glottalization is denoted by an apostrophe, as per the IPA, while pharyngealization is marked by an underdot, for consistency with the transliteration).

(8)

a.	<i>wī[k']a[t']</i>	<i>wīḳad</i>	[type of fish]
	<i>[ḳ']anna[tḥ]</i>	<i>ḳannatt</i>	‘small’
	<i>w-ō-d-alhō[k']</i>	<i>w-ō-d-alhōḳ</i>	‘and I am chasing’

b.	<i>šīwō[tʰ]</i>	<i>šīwōt</i>	‘fire’
	<i>ḥa[tʰ]ō[tʰ]</i>	<i>ḥatʰōt</i>	‘a bean / grain’
	<i>[t]ā[tʰ]</i>	<i>tād</i>	‘one’
c.	<i>[d]rē[pʰ]</i>	<i>drēb</i>	[type of fish]
	<i>[kʰ]a[dkʰ]ay[tʰ]</i>	<i>ḵadḵayd</i>	[type of fish]
	<i>ḡay[tʰ]</i>	<i>ḡayj</i>	‘man’

The data in (8) highlight the phonetic realization of Mahriyōt stops. (8a) shows *k* glottalized (ejective) in all positions (note that, as discussed in Section 3.1, *k* induces back variants of a following vowel). The realizations of *t* are exemplified in (8b), where it is solely pharyngealized initially and medially, but pre-pausally it is subject to glottalization, and generally ejective. (8c) shows voiced stops,⁷¹ which are voiced in all positions except pre-pausally, when they too are subject to glottalization and generally ejective, like emphatic *t*.

With the exception of emphatic *k*, which may be ejective in any position,⁷² Mahriyōt glottalization is seen only in pre-pausal position. Glottalization is variant and may be comparatively weak, as noted by Johnstone in comparing Amharic (Ethio-Semitic) ejective emphatics.⁷³ Pre-pausal glottalization is not restricted to stops, however, and may be seen on various segment types. This is exemplified in (9), below.

(9)

a.	<i>[kʰ]allah</i>	<i>kallah</i>	‘all of it’
	<i>[tʰ]arni[kʰ]</i>	<i>tarnik</i>	[type of fish]
	<i>mtō[tʰ]</i>	<i>mtōt</i>	‘it died’
b.	<i>[š]ābal</i>	<i>šābal</i>	‘cold’
	<i>ḥō[s]</i>	<i>ḥōz</i>	‘goat’
	<i>bā nw[æːs]</i>	<i>bā nwās</i>	Bā Nuwās [name]
	<i>wa-kt[iːf]</i>	<i>wa-ktīf</i>	‘and (let him) go away’
c.	<i>harhē[ʔ]</i>	<i>harhēr</i>	[type of fish]
	<i>h[š]ō[ʔ]</i>	<i>hšōr</i>	‘he attended’
	<i>[b]-ḥāwē[ʔ]</i>	<i>b-ḥāwēl</i>	‘firstly’

In (9a) the voiceless non-emphatic stops are seen to be aspirated initially. Finally, and in pre-pause, the voiceless non-emphatic stops are aspirated, and occasionally, after a long vowel, pre-glottalization also occurs. This is different from the glottalization seen in (8) for emphatics and voiced stops, since pre-glottalization of voiceless aspirates seems not to result in ejectives (i.e. release on a glottalic airstream) and the release of the stop is followed by a period of aspiration. (9b) shows pre-glottalization affecting fricatives in pre-pausal position, but not elsewhere, even when emphatic (e.g. *š* is pharyngealized but not glottalized initially). Pre-glottalization may affect both voiced and voiceless fricatives, but seems only to occur when the fricative follows a long vowel. Lastly, in (9c), three instances of pre-pausal *l* and *r* are shown;⁷⁴ the pre-glottalization of these tokens of the liquids is evident and, notably, they are in pre-pause position and follow a long vowel.

To summarize the data in (8–9), the only segment which is glottalized non-finally is *k*. Otherwise, in Mahriyōt, all other instances of ejectives are in word-final and pre-pausal position, and it is the voiced stops and emphatics which are subject to this. Further, voiceless (aspirated) stops are sometimes also pre-glottalized in this position, although some aspiration is still in evidence following the release of the stop, making them still distinct from glottalized (ejective) voiced stops and emphatics. Otherwise, aspirated stops are aspirated in this position. Fricatives and sonorants are also subject to devoicing and pre-

glottalization when in pre-pause position and following a long vowel. It should be noted additionally that pre-pausal nasals following long vowels are subject to lenition, often elision, with the vowel markedly nasalized in compensation (e.g. *fanj*[*õ̃*], from **fanjōn* ‘cup’). This nasalization is often, but not always, accompanied by glottalization, e.g. *ḥār*[*ãw̃ʔ*], *ḥārawn*, ‘goats’. Long vowels in pre-pausal position are sometimes also glottalized, e.g. *l*[*e:ʔ*], *lē*, ‘cow’.

The pre-pausal process of glottalization is thus similar to that of SA. Glottalization in Mahriyōt is less salient pre-pausally than in SA, however, and seems more variable. However, in Mahriyōt, aspirated stops may also be pre-glottalized, while in SA this does not seem to happen. Where Mahriyōt aspirated stops are not pre-glottalized in this position they are aspirated, but not as heavily as in SA, where they are actually pre-aspirated.

In conclusion, then, we have shown that there are two types of ‘back’ processes in Mahriyōt, and these interact. Firstly, since the emphatics are pharyngealized they participate in vowel allophony. Secondly, there is a process of pre-pausal glottalization that may affect most segment types, including (pharyngealized) emphatics.

We move on now to show how these may differ in another dialect of Mehri, Mehreyyet.

4 Oman: Mehreyyet

As we noted earlier, Mehreyyet is the (group of) dialect(s) spoken in the Omani Najd, and thus constitutes eastern Mehri. It is in many aspects of the grammar apparently the most conservative of the dialect groups.⁷⁵ In this section, we provide an outline of the ‘back’ settings of Mehreyyet. Table 3, below, shows the consonant inventory.

Table 3 Mehreyyet consonant system

		<i>labial</i>	<i>dental</i>	<i>alveolar</i>	<i>palato- alveolar</i>	<i>palatal</i>	<i>velar</i>	<i>uvular</i>	<i>pharyng-eal</i>	<i>glottal</i>
PLOSIVE	voiced	b		d			g			
	voiceless			t			k			ʔ
	emphatic			ṭ			ḵ			
FRICATIVE	voiced		ḍ	z	(ž)			ġ (~q)	ʕ	
	voiceless	f	ṭ	s	š			ḥ	ḥ	h
	emphatic		ṭ̤	ṣ	š̤					
LATERAL	voiced			l						
	voiceless				š̥					
	emphatic				š̥̤					
nasal		m		n						
rhotic				r						
glide		w				y				

There are two points of note arising from the consonant inventory, in respect of differences from Mahriyōt. Firstly, Mehreyyet retains the historical voiced velar stop, *g*, where in Mahriyōt the reflex is palatal / palato-alveolar (*j*). Secondly, the emphatic interdental fricative has variant voicing, but in Mahriyōt is more generally voiceless, *t̪*, while in Mehreyyet it is more generally voiced, *d̪*.⁷⁶

4.1 Backing

As given in Table 3, above, Mehreyyet has the six emphatics *t̪ k̪ ǧ ʃ̣ ʒ̣*; other ‘back’ consonants are the uvulars *ħ* and *g̱* (which is sometimes hardened to [q]), and the pharyngeals ‘ and *ħ*.⁷⁷ In Mehreyyet, the voiced pharyngeal is highly variant, often with very little pharyngeal constriction, and prone to lenition to creak and / or [ʔ], or even complete elision; there is lexical contrast in the ‘strong’ vs ‘weak’ variants of etymological *‘*ayn*’.⁷⁸ The voiceless pharyngeal, too, is less distinct from laryngeal *h* than its Arabic counterpart generally is, since the pharyngeal constriction seems weaker.

As in Mahriyōt, these ‘back’ consonants trigger ‘back’ allophones of certain vowels. For example, following emphatics, uvulars and pharyngeals (or where etymological *‘*ayn* is weak or elided), *ā* and *ē* are realized as [ɑ:] where otherwise they are (respectively) [æ:] to [ɛ:] and [e:]. Therefore, the long vowel of the elative form varies as exemplified in (10).

(10) <i>arħ</i> [ɑ:] <i>m</i>	‘better looking; kinder’	<i>ak̪</i> [ɛ:] <i>r</i>	‘greater’
<i>ak̪l</i> [ɑ:] <i>l</i>	‘fewer’	<i>aħ̪</i> [ɛ:] <i>m</i>	‘thinner’

Following a pharyngeal, uvular or emphatic as the second root radical – or as the first radical where the second is a sonorant, as in *ak̪l*[ɑ:]*l*, above – the long vowel position shows the ‘back’ variant (left-hand column). Otherwise, the vowel is ‘front’.

In Mehreyyet, as already shown for Mahriyōt, ‘back’ consonants trigger diphthongization of *ī* to *ay*, e.g. *kaṭ-ayta*, ‘tire.INTR.FUT-FS’, vs. *sīr-īta*, ‘go.FUT-FS’.⁷⁹ Diphthongization of *ī* to *ay* and *ū* to *aw* is more predictable in Mehreyyet than in Mahriyōt, and can occur even where the trigger is not directly adjacent to the vowel concerned. This is exemplified in (11), below.⁸⁰

(11)			
a.	<i>ħayr</i>	‘donkey’	
	<i>xaylak</i>	‘your m.s. uncle’	
	<i>tūṣaylī</i>	‘you f.s. arrive SUBJ’	
	<i>ṣayd</i>	‘fish’	
	<i>maḵṣayd</i>	‘short cut’	
b.	<i>xawr</i>	‘sea inlet’	
	<i>ḵawt</i>	‘food’	
	<i>ṣṭawt</i>	‘pain’	
	<i>ṣfaḵawt</i>	‘she got married’	<i>riddūt</i> ‘she came back’
	<i>haḵṭawt</i>	‘she [camel] gave birth’	<i>haḵbalūt</i> ‘she approached’
	<i>taṭṭawṭ</i>	‘you m.s./she are/is shaking’	
	<i>faṣṣawt</i>	‘she leant on’	
c.	<i>ṣwayr</i>	‘stones’	
	<i>ḵrawṣ</i>	‘money’	
	<i>ṣarfayt</i>	‘large flat rock’	

<i>ḵannawn</i>	‘small’
<i>maḥṭaym</i>	‘camel bridle/rope’

(11a–b) show *ay* and *aw* (respectively) occurring to the right of uvulars, pharyngeals and emphatics. (11c) exemplifies diphthongization to the right of a ‘back’ consonant, where apparently transparent consonants intervene.⁸¹

Thus we see that in Mehreyyet, too, there is a ‘front’–‘back’ contrast, and that the emphatics pattern as ‘back’ consonants, indicating that they are pharyngealized, as is auditorily perceptible. Glottalization is particularly perceptible in Mehreyyet, and the next section discusses the contexts.

4.2 Glottalization

Mehreyyet, like Mahriyōt, has a pre-pausal process of glottalization. In addition to being pharyngealized, some of the emphatics are realized as glottalics (i.e. ejectives) in positions other than pre-pause. Thus, in general, glottalization is noticeably more widespread in Mehreyyet than in Mahriyōt. Ejective realization of emphatics is often stronger than in Mahriyōt, and ejectives are also more likely non-pre-pausally, so that they are more salient than in Mahriyōt.

We start with the emphatic and voiced stops, *t k b d g*, which are exemplified in (12), below.

(12)

a.	[tʰ]rayrat	ṭrayrat	‘skinny, narrow (camel)’
	[t]awr	ṭawr	‘once’
	ḍa-ḥa[tʰ]ī	ḍa-ḥaṭṭī	‘they f. bend back’
	xō[t]ar	xōṭar	‘down, underneath’
	šīwō[tʰ]	šīwōṭ	‘fire’
b.	[kʰ]āṣam	ḵāṣam	‘cold’
	a[kʰ]armā	aḵarmā	‘poll (of a camel)’
	araw[kʰ]ab	arawḵab	‘hocks (of a camel)’
	a[kʰʰ]fīfūt	aḵfīfūt	‘knees (of a camel)’
	ḍ-īḡawla[kʰ]	ḍ-īḡawlaḵ	‘he (was) watching’
c.	aḡōra[pʰ]	aḡōrab	‘part in front of camel’s hump, withers’
	walā nyū[pʰ]	walā nyūb	‘or they f. are large’
	ktō[pʰ]	ktōb	‘book’
	mday[tʰ]	mdayd	‘long’
	ḡay[kʰ]	ḡayg	‘a man’

The data in (12a) show emphatic *ṭ* and *ḵ* in various positions. In initial position, *ṭ* is often glottalic in Mehreyyet, but not always. Preceding the long ‘back’ vowels *ā*, *ō* and *aw* it is only pharyngealized, and not glottalic.⁸² Otherwise, in initial position it tends to be glottalic. Intervocally at the onset of a stressless syllable, *ṭ* is less likely to be glottalic, but preceding a stressed (in this case non-back) vowel (as in *ḍa-ḥaṭṭī*, above) it is likely to be glottalic. Finally, and in pre-pause position, *ṭ* is glottalic.

(12b) shows emphatic *ḵ*, which is almost invariably glottalic, although there are occasional intervocalic tokens in which glottalization is not evident, in which case *ḵ* may be somewhat voiced.

Lastly, (12c) shows pre-pausal glottalization of voiced stops, as seen in Mahriyōt. In this position (and only in this position), voiced stops are devoiced and glottalized, thus having a tendency to be released as ejectives, i.e. the glottalization manifesting as glottalic initiation. However, with *b* in particular, the release is often very weak and since the stop is in final

position (hence no following vowel) it is not always obvious whether it is more strictly pre-glottalized (that is, with the glottal release preceding the oral) or actually released on a glottalic airstream (the closed glottis initiating the airstream that creates the release burst, and glottal release therefore not occurring before the oral release).⁸³ It should also be noted that since Mehri has no voiceless *p* to contrast with voiced *b*, the need to maintain contrast is anyway absent, and it could be argued that this is also a factor.

A final point of note is that while the pharyngealized quality of *t̤* and *k̤* is evident in non-final position due to vowel allophony, this may not be as evident in pre-pause position, where there is no following vowel. In pre-pause position, therefore, where both emphatics and voiced stops are realised as voiceless and predominantly as ejectives, contrast between them is generally neutralized.

By contrast with the voiced stops and emphatics, voiceless aspirated stops in pre-pause position may be pre-glottalized (and the stop still aspirated). Generally, this aspiration is distinguishable from the sharper burst release evident with the ejective stops (e.g. the voiced stops that are devoiced and glottalized pre-pausally, as in (12), above). Therefore, the voiceless stops *t* and *k* are perceptually distinguishable in this position from voiced stops and emphatics, even when glottalized. The context of this glottalization is shown in (13), below.

(13) <i>mdayda</i> [th]	<i>mdaydat</i>	‘stretched out, long f.’
<i>amkōna</i> [^{kh}]	<i>amkōnak</i>	‘your place / position’
<i>ṭrayra</i> [th]	<i>ṭrayrat</i>	‘skinny, narrow (camel)’
<i>ībīl</i> [th]	<i>ībīt</i>	‘camel’
<i>āfarū</i> [th]	<i>āfarūt</i>	‘red f.’
<i>ūbanī</i> [th]	<i>ūbanīt</i>	‘white f.’
<i>ḥaybīl</i> [th]	<i>ḥaybīt</i>	‘the camel’
<i>w-ankaytā tīl</i> [^{kh}]	<i>w-ankaytā tīk</i>	‘she (will) come to you’
<i>wa-msādēta tēl</i> [^{kh}]	<i>wa-msādēta tēk</i>	‘she (will) help you’

As exemplified in (13), the voiceless aspirated stops are aspirated in pre-pausal position, and often pre-glottalized with a slightly aspirated release. Pre-glottalization seems to occur mostly when the preceding vowel is long, when the glottalization seems to function as a way of prolonging the vowel. Following a short vowel, however, a pre-pausal voiceless stop is aspirated but generally not pre-glottalized.

Fricatives also generally pre-glottalize in pre-pausal position. Emphatic *ṣ*, however, is often glottalic in other positions. The emphatic fricatives *ṣ* (14a), *ṣ̣* (14b), *ḍ* (14c), and pre-pausal non-emphatic fricatives are shown below.

(14)			
a.	<i>[ṣ']alē'</i>	<i>ṣalē'</i>	‘bald’
	<i>[ṣ̣]əṭṭ-ōna</i>	<i>ṣ̣əṭṭ-ōna</i>	‘hurt.FUT-m.s.’
	<i>k-a[ṣ̣]ōbaḥ</i>	<i>k-aṣ̣ōbaḥ</i>	‘in the morning’
	<i>arōba ḍ-ā[ṣ̣]awr</i>	<i>arōba ḍ-āṣ̣awr</i>	‘on the fourth night’
	<i>hīs wī[ṣ̣']al sēkin</i>	<i>hīs wīṣ̣al sēkin</i>	‘when he arrived home’
	<i>yī[ṣ̣:] lā</i>	<i>yīṣ̣ lā</i>	‘he wasn’t afraid’
	<i>ḥaḍḍūr man tāṣ̣ō[']ṣ̣]</i>	<i>ḥaḍḍūr man tāṣ̣ōṣ̣</i>	‘make sure you aren’t afraid!’
b.	<i>ā[ṣ̣]amī</i>	<i>āṣ̣amī</i>	‘I used to’
	<i>bā[']ṣ̣]</i>	<i>bāṣ̣</i>	‘some’
	<i>āray[']ṣ̣]</i>	<i>ārayṣ̣</i>	‘wide’ ⁸⁴

c.	<i>ā[ḏ]amayī</i> <i>mrū[ʔḏ]</i>	<i>āḏamayī</i> <i>mrūḏ</i>	‘my back’ ‘he commissioned’
d.	<i>ār aḡaw[ʔf]</i> <i>tī[ʔs]</i> <i>bī[ʔs]</i> <i>tē[ʔḏ]</i> <i>ši[f:]</i> <i>arḥamta[s]</i> <i>axa[s:]</i> <i>śabōwa[t]</i>	<i>ār aḡawf</i> <i>tīs</i> <i>bīs</i> <i>tēt</i> <i>šiff</i> <i>arḥamtas</i> <i>axass</i> <i>śabōwaṭ</i>	‘up(wards)’ ‘ACC.her / it f.’ ‘of / about her / it f.’ ‘woman’ ‘hair, fur’ ‘her beauty’ ‘worse’ ‘lips’

In (14a), the emphatic coronal fricative *ṣ* is exemplified in a number of contexts. Initially, it is often glottalized, but this seems more variable than in the case of the coronal stop *t*, and glottalization is often not very salient, apparently manifesting as laryngeal tenseness.^{85 86} When *ṣ* is not clearly glottalic, it is often at least partly, if not fully, voiced, as heard in one token of *ḏ-āṣawr*, above; this voicing, too, is variable.⁸⁷ There are tokens of *ṣ* produced as ejective in medial position, but a clear context vis à vis vowels has yet to be established, if there is one. The picture is probably further complicated by inter-speaker variability. In final, pre-pause position, *ṣ* is voiceless and subject to pre-glottalization.

The emphatic lateral fricative *ṣ̣* is exemplified in (14b). This is not generally realized as an ejective, instead being pharyngealized in all positions, and in pre-pausal position being pre-glottalized. In non-final position it is very often voiced (at least partly, often fully). The emphatic interdental *ḏ*, shown in (14c), likewise is pharyngealized in all positions and pre-glottalized in pre-pause position. It tends mostly to be voiced in Mehreyyet, except in pre-pause, when it is devoiced in addition to being pre-glottalized.

The data in (14d) exemplify non-emphatic fricatives in Mehreyyet. Following long vowels, fricatives are pre-glottalized in pre-pause position. Following a short vowel, however, a pre-pausal fricative is generally not pre-glottalized. This is like the pattern seen with pre-glottalization of voiceless aspirated stops (in (13), above).

The final set of data is for liquids and nasals. These are exemplified in (15).

(15)

a.	<i>ṭway[ʔḏ]</i> <i>anxarī[ʔṛ]</i> <i>ṭōma[r]</i> <i>ōśa[r]</i> <i>aba[ṛʔ]</i> <i>ši[l:ʔ]</i> <i>ka[l:]</i>	<i>ṭwayl</i> <i>anxarīr</i> <i>ṭōmar</i> <i>ōśar</i> <i>abarr</i> <i>šill</i> <i>kall</i>	‘long’ ‘nose’ ‘dates’ ‘ten’ ‘outside’ ‘he took’ ‘all’
b.	<i>flā[ʔḏ]</i> <i>faw[ʔḡ]</i> <i>tōli ghē[ʔḡ]</i> <i>hīs wīṣal sēki[n]</i> <i>landa[n]</i> <i>hnīha[m]</i>	<i>flān</i> <i>fawm</i> <i>tōli ghēm</i> <i>hīs wīṣal sēkin</i> <i>landan</i> <i>hnīham</i>	‘such-and-such’ ‘leg’ ‘then he set off’ ‘when he arrived home’ ‘London’ ‘with them, at their house’

The liquids *l* and *r* are shown in (15a). These are clearly devoiced and pre-glottalized pre-pausally when the preceding vowel is long. Following a short vowel, however, pre-glottalization seems not to occur. There often appears to be a glottal closure marking the end of the phrase following the final consonant, so for instance one pre-pausal token of *šill* could be heard as *ši[lʔ]*, whereas three tokens of *kall*, although word-final, were not in pre-pause, and were neither devoiced nor glottalized. This pre-pausal glottalization seems to occur with a stressed syllable, so for instance doesn't seem evident with *tōmar*, where stress falls on the first syllable, but with *abarr*, where the stress is final, voicing tails off into a glottal closure, and it may perhaps be transcribed very narrowly as *aba[r̥ʔ]*.

The nasals also display this pattern of pre-glottalization following a long vowel, as shown in (15b). In this context, the nasal may be elided and the preceding vowel nasalized, with a clear glottal stop then following, although this is not as common in Mehreyyet as in Mahriyōt.⁸⁸ Where a nasal closes an unstressed syllable containing a short vowel, pre-glottalization seems rare, although as with the liquids, there may be a glottal closure marking the end of the phrase, as e.g. *sēkin*, one token of which in the data may be very narrowly transcribed as *sēki[nʔ]*.

Finally, pre-pausal vowels, too, are generally marked by a phrase-final glottal closure. For instance, *āšamī*, 'I used to', *āšam[iʔ]*; the negator *lā*, *l[æʔ]*,⁸⁹ *twāsa*, 'towards it', *twās[ɛʔ]*.

As with Šanʿāni Arabic, in Section 2, above, Mehreyyet glottalization is blocked in the case of a final voiceless laryngeal *h* or pharyngeal *ħ*. This is shown in (16), where '/' in the final example indicates a pause.

(16) <i>k-aṣōba[h]</i>	<i>k-aṣōbaħ</i>	'in the morning'
<i>bawma[h]</i>	<i>bawmah</i>	'here'
<i>azwōda[h]</i>	<i>azwōdah</i>	'his supplies'
<i>wa-ħagta[h]</i> / <i>ħagta[h]</i>	<i>wa-ħagtah</i> / <i>ħagtah</i>	'and his things / his things'

Final laryngeal *h* is often almost imperceptible, but the absence of glottalization is in itself salient. Glottalization is also not evident when a final consonant cluster involves *h*, as in e.g. *ħaybith* 'his camel' (compare *ħaybīt*, in (13) above, which is glottalized); the final *th* is distinct from a final (unglottalized) aspirated *t* (as in *mdaydat*, in (13), above) because a very brief, voiceless excremental schwa is evident in the cluster: *ħaybi[thʰ]*.

To sum up what we have shown in this section vis à vis glottalization, we can say that in Mehreyyet:

EMPHATICS

- k* is almost invariably ejective
- t* is most often ejective word-initially and/or before non-back vowels, and pre-pausally; before the back vowels *ā*, *ō* and *aw* and/or at the onset of a stressless syllable it is generally only pharyngealized
- ṣ* is often glottalized initially (more variable than *t*); glottalization is often not very salient, but laryngeal tension is evident and it is often partly to fully voiced; glottalization in medial position is highly variant; pre-pausally it is voiceless and pre-glottalized
- ṣ̣* and *ḍ̣* are pharyngealized in all positions and glottalized only pre-pausally, in which case they are both devoiced and pre-glottalized (not ejective); *ṣ̣* is very often (partly to fully) voiced non-finally; *ḍ̣* is mostly voiced non-finally

NON-EMPHATICS

VOICED STOPS

- the voiced stops *b d g* are subject to pre-pausal glottalization, in which case they are devoiced and released as ejectives

VOICELESS ASPIRATED STOPS

- the (non-emphatic) voiceless aspirated stops *t k* are aspirated pre-pausally; when preceded by a long vowel they are pre-glottalized, but this is rare when preceded by a short vowel

FRICATIVES

- g. with the exception of *h* and *ħ*, fricatives are pre-glottalized in pause position following a long vowel; following a short vowel, a pre-pausal fricative is generally not pre-glottalized

SONORANTS

- h. the liquids *l* and *r* are devoiced and pre-glottalized pre-pausally when the preceding vowel is long; following a short vowel, pre-glottalization seems not to occur
- i. the nasals *m* and *n* are often devoiced and pre-glottalized pre-pausally when the preceding vowel is long, although in this context the nasal may be replaced by nasalization of the preceding vowel, followed by a glottal stop; following an unstressed short vowel, pre-glottalization seems rare
- j. vowels are marked by a phrase-final glottal closure

LARYNGEAL AND PHARYNGEAL BLOCKERS

- k. laryngeal *h* and pharyngeal *ħ* are not subject to pre-pausal glottalization

To compare with the Mahriyōt data, we can see that glottalization in Mehreyyet is more widespread. In Mahriyōt, it occurs only with the velar emphatic *k*, which is almost invariably ejective, but glottalization is otherwise restricted to pre-pausal position, as is also the case for SA. In Mahriyōt, however, the emphatic *k* is invariably glottalized, *t* and *s* are glottalized in certain contexts non-finally, as well as in pre-pausal position, and most of the remaining consonants are pre-pausally glottalized.

5 Conclusion

This paper has investigated ‘back’ settings in three language varieties of the south-west Arabian Peninsula: Šan‘āni Arabic (Yemen), Mahriyōt (mostly Yemen), and Mehreyyet (mostly Oman). All three have ‘back’ consonants which participate in at least some backing processes. In Mehri, pharyngealization is seen in allophony of adjacent vowels; in Šan‘āni Arabic, there is a process of pharyngealization spread triggered by emphatics, in addition to labio-velarization, both of which processes function as ‘backing’ (in opposition to ‘fronting’). The Šan‘āni voiceless emphatic stop also differs from the voiceless non-emphatics with respect to laryngeal settings: the latter are aspirated, while the former is not. This difference can be seen in phonological patterning: pre-pausally, voiceless aspirated stops are heavily aspirated, while the emphatic stop patterns with the voiced stops in being glottalized (thereby generally ejective). Šan‘āni pre-pausal glottalization affects most segments and is particularly salient; for instance to those familiar with other dialects of Arabic it is a striking feature of Šan‘āni. Glottalization is an areal feature, however, and is also striking in listening to MSAL. As we have shown for Mehri, this is partially phonemic, although this varies across dialects, so for Mahrīyōt only emphatic *k* is underlyingly ejective, while for Mehreyyet *k* is always ejective, *t* and *s* are very often ejective, and remaining segments, as in Mahrīyōt, are glottalized only in pre-pausal position.

We discussed above how MSAL emphatics have been described in the literature as ‘ejectives’, but this paper demonstrates that this is an over-simplification, certainly for Mehri, and in all likelihood for other MSAL too. Mehri emphatics are phonemically pharyngealized and only in some cases also glottalic. It may be pertinent that these are the most commonly occurring emphatics (in the case of Mehreyyet *k t s*). Otherwise, glottalization is the result of a predictable pre-pausal process. Therefore, while glottalization may be a salient feature of the MSAL (in some varieties more than others), it is misleading to say simply that MSAL emphatics ‘are’ ejectives.

We have shown Mehri to have a mixed system. We can conclude from this that at least Mehri (and probably the other MSAL)⁹⁰ provides good evidence of a system in transition. Emphatics in some Semitic language varieties are solely pharyngealized (e.g. some Arabic dialects), while some Semitic language varieties appear to have a system in which (usually) entire words are either ‘backed’ or ‘non-backed’, with no obvious trigger to indicate a synchronic process of spreading (e.g. some Neo-Aramaic),⁹¹ and other Semitic languages have no pharyngealization, with emphatics as purely glottalic (which functions as a laryngeal contrast in opposition to voiced and voiceless aspirated consonants, as in Ethio-Semitic languages like Amharic and Tigrinya). Other Semitic language varieties are more mixed, indicating transition between these systems.⁹²

It is worth re-iterating here that the glottalics discussed in this paper for Mehri and Šan‘āni Arabic are different at least functionally from those found in Ethio-Semitic languages such as Tigrinya. In Tigrinya, glottalization is not a secondary process but a primary laryngeal contrast, and emphatics are phonemic ejectives in all positions. Further, in Tigrinya the ejectives do not cause vowel lowering / backing, and there is no evidence of pharyngealization.⁹³

In contrast, it is clear that ‘emphatic’ across Arabic does not have only one phonetic correlate, but several (which vary across dialects) that together create a predominant perception of ‘darkness’. However, a further conclusion arising from our work on Mehri emphatics is that ‘emphatic’ does not always have the same set of phonetic correlates within one language variety. So while the velar emphatic is invariably ejective, the coronal stop emphatic (*t*), for instance, is not ejective, except through a process of pre-pausal glottalization which affects most segment types and is thus not part of any ‘emphatic’ identity.

There are thus several pertinent points of note concerning glottalization and pharyngealization. Both are in a sense ‘back’ phenomena, and may be related⁹⁴ – this paper has shown how they interact in three language varieties. In two of these language varieties, glottalization is both lexically present and a prosodic process; in one language, glottalization is a prosodic process only. Pharyngealization, on the other hand is lexically present in all three of these language varieties, but while a process of pharyngealization is very limited in both Mehri varieties, it is a far more comprehensive process in Šan‘āni.

In drawing conclusions that are of typological relevance, we can look at these ‘back’ phenomena in terms of types of contrast, distinguishing between resonance contrasts and laryngeal contrasts. Thus, what is noticeable particularly in Šan‘āni is that these resonance contrasts pervade the whole system (pharyngealization – labio-velarization – palatalization), and emphatics are only a part of this. Emphatics pattern melodically with pharyngeals (and other gutturals), and also to some extent with labio-velars, to create a ‘back’ resonance (or rather, a ‘back’ and ‘round’ alliance) which contrasts with a ‘front’ resonance. In Mehri, there is a resonance contrast of ‘back’ and ‘front’, but this is less pervasive. In all three of these language varieties, emphatics are a part of the system of laryngeal contrasts. In all three, voiceless emphatics pattern laryngeally with voiced consonants rather than voiceless.

These different types of contrast (resonance vs laryngeal) relate to different functions within a language’s sound system, or phonology. SWAP language varieties are therefore of particular typological interest, as demonstrated in this paper, because they exemplify how ‘back’ phenomena may interact, despite being functionally distinct. Further, SWAP languages provide evidence for the changing nature of ‘emphatic’, a category which straddles the boundary between the two types of functional contrast.

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NOTES

¹ Map from University of Texas, Perry-Castañeda Library Map Collection, available online at: <http://www.lib.utexas.edu/maps/> (last accessed 1 May 2012).

² H.A. Ali & R.G. Daniloff, ‘A Contrastive Cinefluorographic Investigation of the Articulation of Emphatic–Non Emphatic Cognate Consonants’, *Studia Linguistica* 26 (1972), 81–105, and ‘A Cinefluorographic–Phonologic Investigation of Emphatic Sound Assimilation in Arabic’, in A. Rigault & R. Charbonneau (eds), *Proceedings of the 7th International Congress of Phonetic Sciences* (The Hague 1972), 639–48; S. al-Ani & M.S. el-Dalee, ‘Tafkhim in Arabic: The Acoustic and Psychological Parameters’, *Proceedings of the 10th International Congress of Phonetic Sciences* (Dordrecht 1984), 385–9. See also A.A. al-Nassir, *Sibawayh the Phonologist: A Critical Study of the Phonetic and Phonological Theory of Sibawayh as Presented in his Treatise Al-Kitab* (London & New York 1993); A. Laufer & T. Baer, ‘The Emphatic and Pharyngeal sounds in Hebrew and in Arabic’, *Language and Speech* 31 (1988), 181–205; Feda Al-Tamimi & Barry Heselwood, ‘Nasoendoscopic, Videofluoroscopic and Acoustic Study of Plain and Emphatic Coronals in Jordanian Arabic’, in Z.M. Hassan & B. Heselwood (eds), *Instrumental Studies in Arabic Phonetics* (Amsterdam 2011), 165–91.

³ With advancements in instrumental techniques that have enabled closer investigation, the term velarization is now rarely used.

⁴ Salem Ghazeli, ‘Back Consonants and Backing Coarticulation in Arabic’, unpublished PhD thesis (University of Austin, Texas 1977); Feda Al-Tamimi, Firas Alzoubi & Rama Tarawnah, ‘A Videofluoroscopic Study of the Emphatic Consonants in Jordanian Arabic’, *Folia Phoniatrica et Logopaedica* 61 (2009), 247–

53; Al-Tamimi & Heselwood, 'Emphatic Coronals in Jordanian Arabic', 184. See also Bushrah A. Zawaydeh 'The Phonetics and Phonology of Gutturals in Arabic', unpublished PhD thesis (Indiana University 1999).

⁵ Al-Tamimi & Heselwood, 'Emphatic Coronals in Jordanian Arabic', 184.

⁶ E.g. Ph. Marçais, 'L'articulation de l'emphase dans un parler arabe maghrébin', *Annales de l'Institut d'Etudes Orientales* (University of Algiers 1948), 5–28; Walter Lehn, 'Emphasis in Cairo Arabic', *Language* 39:1 (1963), 29–39.

⁷ Cairene, for instance, has been observed to manifest slight lip protrusion or rounding, although this is confined to the emphatic consonant itself and doesn't spread (R. Harrell, *The Phonology of Colloquial Egyptian Arabic* [Washington, D.C. 1957], 69–70; Walter Lehn & P. Abboud, *Beginning Cairo Arabic* [Austin 1965], 271).

⁸ See this characterization in Bruce Ingham, 'Urban and Rural Arabic in Khūzistān', *BSOAS* 36:3 (1973), 533–53; 'The Phonology and Morphology of the Verbal Piece in an Arabic Dialect of Khuzistan', unpublished PhD thesis (SOAS, University of London 1974); 'Regional and Social Factors in the Dialect Geography of Southern Iraq and Khūzistān', *BSOAS* 39:1 (1976), 62–82.

⁹ Janet C.E. Watson, 'Emphasis in San'ānī Arabic', *Three Topics in Arabic Phonology* (CMEIS Occasional Paper 53, Durham 1996), 45; 'The Directionality of Emphasis Spread in Arabic', *Linguistic Inquiry* 30:2 (1999), 289–300; *The Phonology and Morphology of Arabic* (Oxford 2002), 269–70.

¹⁰ Alex Bellem, 'Towards a Comparative Typology of Emphatics: Across Semitic and into Arabic Dialect Phonology', unpublished PhD thesis (University of London 2008), Chapters 5–6. For examples of discussion of this in the literature, see e.g. Lehn, 'Emphasis', 30–1; Clive D. Holes, *Modern Arabic: Structures, Functions and Varieties*, (London 1995), 56; Ghada Khattab, Feda Al-Tamimi & Barry Heselwood, 'Acoustic and Auditory Differences in the /t/-t/ Opposition in Male and Female Speakers of Jordanian Arabic', in Sami Boudelaa (ed.), *Perspectives on Arabic Linguistics 16* (Amsterdam 2006), 142–3; Al-Tamimi & Heselwood, 'Emphatic Coronals in Jordanian Arabic'.

¹¹ Moroccan Arabic dialects are particularly interesting in this regard. See e.g. Jeffrey Heath, *Ablaut and Ambiguity: Phonology of a Moroccan Arabic Dialect* (New York 1987); and Chakir Zeroual, John H. Esling & Philip Hoole, 'EMA, Endoscopic, Ultrasound and Acoustic Study of Two Secondary Articulations in Moroccan Arabic: Labial-Velarisation vs. Emphasis', in Hassan & Heselwood, *Instrumental Studies*, 277–97.

¹² Khattab et al., 'Acoustic and Auditory Differences', 140–1.

¹³ See Bellem, 'Emphatics' for a discussion of the auditory effects, and the characterization of this in terms of 'a-colouring' (emphatics) vs 'i-colouring' (non-emphatics).

¹⁴ This may be better couched in terms of phonological elements, rather than features, which map onto overall auditory effects, rather than being seen as mapping directly onto articulatory gestures. 'Pharyngealization' is thus a-colouring, i.e. the phonological element A. See Bellem, 'Emphatics' for further discussion and analysis within the framework of Element Theory.

¹⁵ One could perhaps argue for the slightly clunky term 'uvulo-pharyngealization'. This has the advantage of clearly differentiating this type of uvularization / pharyngealization from e.g. the type of 'pharyngealization' manifest in North East Caucasian languages. In the latter, the phonetic and phonological evidence overwhelmingly points to 'pharyngealization' as being actually palato-pharyngealization. (Alex Bellem, "'Pharyngeal" and "Pharyngealisation" in the Caucasian Languages: Phonological Correlates vs Phonetic Realisations', paper delivered at 13mfm [13th Manchester Phonology Meeting, 26–28 May 2005], and 'Typologising Resonance Patterns in Arabic and North-East Caucasian' [in prep.; paper delivered at the Colloquium on 'Backing / Base Articulaire Arrière', Paris, May 2–4 2012].)

¹⁶ Janet C.E. Watson, 'Šan'ānī Arabic', in K. Versteegh (ed.), *Encyclopedia of Arabic Language and Linguistics*, IV: Q–Z (Leiden 2009), 106–15. See also Watson, *Phonology and Morphology*, 10; and Samia Naïm, *L'Arabe Yéménite de Sanaa* (Leuven 2009). For a brief overview of the Arabic dialects of Yemen, see Martine Vanhove, 'Yemen', in Versteegh, *Encyclopedia*, IV, 750–58.

¹⁷ This is the SA reflex of Old Arabic *q*, i.e. Common Semitic *ḳ*.

¹⁸ In pre-consonantal position, *j* is realized as a fricative [ʃ], especially by younger speakers.

¹⁹ Strictly speaking, of course, a labio-velar glide. This is important given the discussion below of labialization as a 'backing' process.

²⁰ See Alex Bellem, 'Triads, Emphatics and Interdentals in Arabic Sound System Typology' (this volume).

²¹ Watson, 'Directionality', and *Phonology and Morphology*.

²² These can be seen as *imāla* contexts, in the terminology of the traditional grammarians. Typically, these are contexts in which the low vowel *ā* (/ *a*) is fronted and often raised, e.g. [ɪmæːlɪ] *imāla* (lit. 'inclination'), cf. [baʔaːlɪ] *baʔāla* 'unemployment'; [beldɪ] *balda* 'town(ship)', cf. [balʔa] *balʔa* 'axe'.

²³ The phonological transcriptions are for SA, rather than transliterations of the Standard written form. Note that the *tā marbūʔa* 'feminine' ending in SA is clearly *-ih*, with a final voiceless glottal fricative (where in many dialects this final *-h* is not present).

²⁴ Under a Government Phonology interpretation, the *-i-* here would not be lexical (phonemic), but the realisation of an empty nuclear position; while a back round vowel is found in back contexts, a front non-round vowel is found in front contexts. That is, the high vowel quality is dependent on context, not just in the 'backing' case, but also in the 'fronting' case; palatalization is a process just as much as is backing. See Bellem, 'Emphatics', 245–7 for a fuller discussion and analysis within this framework of the Damascene Arabic *tā marbūʔa* suffix.

²⁵ See Watson, 'Directionality', and *Phonology and Morphology* for a full analysis.

²⁶ The coronal *r* often behaves as an emphatic, but not always. This varies across dialects, but there are many reports of *r* being sometimes lexically emphatic (i.e. more accurately *ṛ*) and sometimes not (this seems the only analysis possible for Moroccan Arabic, see Heath, *Ablaut and Ambiguity*), or at least that *r* very often is 'back' in a context where it is not adjacent to a non-emphatic coronal and there are no front vowels. This is generally the case for Baghdadi Arabic and Damascene, although there are some odd exceptions – see Bellem, 'Emphatics', for further discussion. There is debate in the literature on Arabic *r*, see for instance (among others): Charles A. Ferguson, 'The Emphatic l in Arabic', *Language* 32:2 (1956), 446–52 (reprinted in R. Kirk Belnap & Niloofar Haeri, *Structuralist Studies in Arabic Linguistics: Charles A. Ferguson's Papers, 1954–1994* (Leiden 1997); Elizabeth A. Card, 'A Phonetic and Phonological Study of Arabic Emphasis', unpublished PhD thesis (Cornell University 1983); R. Herzallah, 'Aspects of Palestinian Arabic Phonology: A Non-Linear Approach', unpublished PhD thesis (Cornell University 1990); Munther Younes, 'On Emphasis and /r/ in Arabic', in M. Eid, V. Cantarino & K. Walters (eds), *Perspectives on Arabic Linguistics VI: Papers from the 6th Annual Symposium on Arabic Linguistics* (Amsterdam 1994), 215–35; John J. McCarthy, 'The

Phonetics and Phonology of Semitic Pharyngeals', in P. Keating (ed.), *Phonological Structure and Phonetic Form: Papers in Laboratory Phonology III* (Cambridge 1994), 191–233.

²⁷ See Watson, *Phonology and Morphology*, 263–5 for full discussion and analysis of this in SA. See Bellem, 'Emphatics' for discussion and analysis of how labio-velarization is a backing process often subsumed under the label 'emphasis'.

²⁸ The data follows Watson, *Phonology and Morphology*, 263.

²⁹ For a full discussion of the analysis of this in terms of Element Theory (the resonance elements A, U and I), see Bellem, 'Emphatics', and 'Typologising Resonance Patterns'. For an earlier analysis of resonance patterns in Baghdadi Arabic in terms of *i*-colouring, *u*-colouring, etc., see Haim Blanc, *Communal Dialects in Baghdad* (Cambridge, MA 1964).

³⁰ See Bellem, 'Triads, Emphatics and Interdentals', for a full discussion of these laryngeal categories and how they are measured.

³¹ An acoustic study of these stops is presented in Janet C.E. Watson & Alex Bellem, 'Glottalisation and Neutralisation in Yemeni Arabic and Mehri', in Hassan & Heselwood, *Instrumental Studies*, 235–56.

³² Otto Jastrow, 'Zur Phonologie und Phonetik des Šan'ānischen', in H. Kopp & G. Schweizer (eds), *Entwicklungsprozesse in der Arabischen Republik Jemen* (Wiesbaden 1984), 289–303; P. Behnstedt, *Die nordjemenitischen Dialekte*, I: *Atlas* (Wiesbaden 1985); Samia Naïm-Sanbar, 'Contribution à l'étude de l'accent yéménite: le parler des femmes de l'ancienne génération', *Zeitschrift für Arabische Linguistik* 27 (1994), 67–89; Janet C.E. Watson, *A Syntax of Šan'āni Arabic* (Wiesbaden 1993); Samia Naïm, *L'arabe yéménite de Sanaa* (Leuven 2009); Watson, *Phonology and Morphology*, 252; Janet C.E. Watson & Yahya Asiri, 'Pre-pausal Devoicing and Glottalisation in Varieties of the South-Western Arabian Peninsula', in J. Trouvain & W. Barry (eds), *Proceedings of the 16th International Congress of Phonetic Sciences* (Saarbrücken 2007); Watson & Bellem, 'Glottalisation and Neutralisation'. Word-final / utterance-final devoicing of otherwise voiced obstruents is common across Arabic; see e.g. Manfred Woidich, *Das Kairenisch-Arabische: Eine Grammatik* (Wiesbaden 2006).

³³ See the acoustic analysis in Watson & Bellem, 'Glottalisation and Neutralisation', which revealed that in fact aspirated stops in pre-pausal position in SA are markedly *pre*-aspirated.

³⁴ The effect of creak is produced by tensing the vocal folds and narrowing the glottis and / or by slower vocal fold vibration (there is a good, detailed discussion of this in Katrina Hayward, *Experimental Phonetics* [Harlow 2000], 223–36).

³⁵ It is not always clear where to draw the line between creaky voice and glottalic airstream. Both implosives and ejectives often induce creak on a following vowel, for instance, and where an implosive or ejective is not particularly strong it may sound rather more like a creaky obstruent, or indeed the presence of an implosive / ejective may in certain contexts be perceptually cued simply by creak. While it can be useful to differentiate phonetically, it would seem more appropriate phonologically to view both as glottalization. See the discussion in Peter Ladefoged & Ian Maddieson, *The Sounds of the World's Languages* (Cambridge, MA 1996), 74.

³⁶ Bellem, 'Triads, Emphatics and Interdentals' (this volume) presents a more detailed discussion of the articulation of ejectives.

³⁷ In our data, glottalization of non-sibilant fricatives often results in some affrication.

³⁸ Note that *j* behaves as a stop, although it is (at least phonetically) an affricate.

³⁹ These segments are occasionally not released, although this is most often in the case of the labial stop, *b*. For aerodynamic reasons, the release burst of labials is less intense (less strong) and the ejectiveness thus less salient. In previously analysed data, we observed that *b*, when released, often had a weak release. Where not released, of course, glottalization effectively takes the form of pre-glottalization. (Watson & Bellem, 'Glottalisation and Neutralisation', 243–4.)

⁴⁰ Leading up to the glottal closure, a period of creak, i.e. markedly irregular cycles of glottal pulsing (voicing), is evident in acoustic analysis (Watson & Bellem, 'Glottalisation and Neutralisation'). This is evident in most of the tokens analysed, not just in the case of final vowels, where the vowel preceding glottal closure has a creaky offset, often markedly so. The creakiness is due to the tensing of the vocal folds moving into the glottal closure.

⁴¹ Watson & Bellem, 'Glottalisation and Neutralisation', 242, gives a spectrogram and waveform highlighting the breathy voice and aspiration in the vowel offset and preceding closure of *t* in a token of *l-mawt*.

⁴² A recording of 7 minutes 20 seconds in length. The speaker was a monolingual female of around 14 years old, born and brought up in Šan'ā. The recording was made in Šan'ā in 1997 by Watson.

⁴³ Peter Behnstedt, 'Zur Dialektgeographie des Nord-Jemen', in Kopp & Schweizer, *Entwicklungsprozesse*, 261–87.

⁴⁴ Watson & Asiri, 'Pre-pausal Devoicing and Glottalisation'.

⁴⁵ Abdullah Al-Saqqaf, 'Simplification in Hadrami Arabic', *Matériaux arabes et sudarabiques (MAS)* 10 (2000–2), 143–57.

⁴⁶ See the discussions in Janet C.E. Watson & Alex Bellem, 'A Detective Story: Emphatics in Mehri', *Proceedings of the Seminar for Arabian Studies* 40 (2010), 345–56; Watson & Bellem, 'Glottalisation and Neutralisation'.

⁴⁷ Janet C.E. Watson, *The Structure of Mehri* (Wiesbaden 2012), 1.

⁴⁸ *Ibid.*

⁴⁹ See Watson, *Structure of Mehri*, 10–14 for detailed discussion.

⁵⁰ Attested only in Arabic loans.

⁵¹ This is the reflex of historical *g (which is attested as such in other dialects of Mehri, see Table 3, below, for Mehreyyet), and is thus the voiced member of the velar triad (*k ḳ g*). We give the phonemic value *j*, although it is realized along a continuum from palatal to palato-alveolar, and often fricative to approximant-like, rather than strictly a stop ([j] ~ [j̞] ~ [dʒ]).

⁵² Often transcribed <č>, as it is in certain contexts realized as an affricate. We use <š> as more phonologically appropriate.

⁵³ Often transcribed <ž>. We use <š> as more phonologically appropriate, as in Watson 2012.

⁵⁴ A. Jahn, *Südarabische Expedition*, III: *Die Mehri-Sprache in Südarabien* (Vienna 1902); D.H. Müller, *Südarabische Expedition*, IX: *Mehri- und Hadrami-Texte Gesammelt im Jahre 1902. In Gischin von Dr. Wilhelm Hein* (Vienna 1909); Maximilian Bittner, *Studien zur Laut- und Formenlehre der Mehri-Sprache in Südarabien*, I: *Zum Nomen im Engeren Sinn* (Vienna 1909).

⁵⁵ Bertram Thomas, *Four Strange Tongues from Central South Arabia: The Hadara Group* (London 1937); Wolf Leslau, 'Four Modern South Arabian Languages', *Word* 3 (1947), 180–203.

⁵⁶ These inconsistencies are most often related to laryngeal category, e.g. *k* transcribed as <g> or occasionally <k>, and *ṣ* as <z> or <s> (e.g. by Hein [Müller, *Mehri- und Hadrami-Texte*]).

⁵⁷ As yet there are no instrumental studies (such as X-ray, ultrasound or laryngoscopic experiments) to show this definitively. However, the acoustic evidence (through spectrographic analysis of adjacent vowels), along with native speaker descriptions of the articulation indicate some degree of pharyngealization. See Watson & Bellem, 'Detective Story', and 'Glottalisation and Neutralisation'.

⁵⁸ Fulgence Fresnel, 'Cinquième lettre sur l'histoire des Arabes avant l'islamisme', *Journal Asiatique* 6 (1838), 545.

⁵⁹ Subsequently published as T.M. Johnstone, 'Contrasting Articulations in the Modern South Arabian Languages', in J. & Th. Bynon (eds), *Hamito-Semitic. Proceedings of a Colloquium Held at the School of Oriental and African Studies, University of London, on the 18th, 19th and 20th of March 1970* (Le Hague–Paris 1975), 155–159.

⁶⁰ T.M. Johnstone, 'The Modern South Arabian Languages', in *Afroasiatic Linguistics* 1:5 (1975), 98.

⁶¹ T.M. Johnstone, *Mehri Lexicon and English–Mehri Word-List*, ed. G.R. Smith (London 1987), and 'Mahri', in C.E. Bosworth et al (eds), *The Encyclopaedia of Islam* VI (Leiden 1990), 84–5; M.-Cl. Simeone-Senelle, 'Sukūṭra', in *EI* VI (1990), 806–11, and 'The Modern South Arabian languages', in R. Hetztrou (ed.), *The Semitic Languages* (London 1997), 378–423; A. Lonnet & M.-Cl. Simeone-Senelle, 'Observations phonétiques et phonologiques sur les consonnes d'un dialecte mehri', *Matériaux Arabes et Sudarabique (MAS-GELLAS)* 1 (1983), 187–218, and 'La phonologie des langues sudarabiques modernes', in A.S. Kaye (ed.), *Phonologies of Asia and Africa (Including the Caucasus)*, I (Indiana 1997), 337–71. W. Arnold ('*Shihri*', in *EI* IX [1997], 439) proposes that since *Ṣheri* and the other MSAL have 'common features with ... the languages of Ethiopia (ejectives) ... they should be incorporated in the group of South Semitic to the exclusion of Arabic.' Thus, the misleading notion that MSAL emphatics are, like those of Ethio-Semitic, invariably ejective has taken hold. This leads to the over-simplistic assumption that MSAL ejectives are functionally, systemically equivalent to those of Ethio-Semitic. It is this over-simplification that we wish to address.

⁶² Simeone-Senelle, 'Modern South Arabian languages', 382.

⁶³ A. Lonnet, 'South Arabian, Modern', in K. Versteegh et al. (eds), *Encyclopedia of Arabic Language and Linguistics*, IV (Leiden 2009), 297–300. Note also that Soqotri has been described as having ejective plosive emphatics, but pharyngealized fricative emphatics (V.V. Naumkin & V.Y. Porkhomovskij, *Ocherki po Etnolingvistike Sokotry* ['Essays on Ethnolinguistics of Socotra', Moscow 1981]).

⁶⁴ Watson & Bellem, 'Detective Story', and 'Glottalisation and Neutralisation'; Watson, *Structure of Mehri*.

⁶⁵ Alexander Sima, *Mehri-Texte aus der jemenitischen Sharqīyah: Transkribiert unter Mitwirkung von ʿAskari Saʿd ugayrān*, edited, annotated and introduced by J.C.E. Watson & W. Arnold (Wiesbaden 2009); Watson & Bellem, 'Detective Story', 347–8; Watson, *Structure of Mehri*, 14–16; Johnstone, *Mehri Lexicon*.

⁶⁶ Watson & Bellem, 'Detective Story', 348; Watson, *Structure of Mehri*, 15, 25; Sima, *Mehri-Texte*, 14–16.

⁶⁷ There are quite a number of exceptions to this, and in Mahriyōt it is not as regular as in Mehreyyet (see Section 4, below). For the data, see Watson, *Structure of Mehri*, 15, 28–9.

⁶⁸ Watson & Bellem, 'Detective Story', 349.

⁶⁹ For instance, while Caucasian languages have a different type of pharyngealization than MSAL or Arabic (in at least North-East Caucasian languages it is palato-pharyngealization – see Bellem, 'Typologising Resonance Patterns'), consonants may be both pharyngealized and ejective. Pharyngealized consonants can contrast in NW Caucasian with plain, rounded and palatalized consonants; these same consonants may then contrast in laryngeal category between voiced, voiceless, ejective, and so on. Thus, Ubykh voiceless uvular stops contrast as follows: *q qʰ qʷ qʳ qʷ qʳ qʷ qʳ qʷ qʳ qʷ qʳ* (see John Colarusso, 'How Many Consonants Does Ubykh Have?', in G. Hewitt (ed.), *Caucasian Perspectives* [Munich 1992], 154). Note also that in Arabic the emphatics may also be glottalized, as happens due to pre-pausal glottalization in SA, in Section 2, above; also, there are occasional reports of glottalized emphatics, e.g. [tʰ], in some dialects: for instance in two Northern Sinai Bedouin dialects, 't' followed by a vowel is often accompanied by a degree of glottalization (...tʰ). Such glottalization is especially apparent when tʰ (an "ejective stop", IPA [tʰ]) is followed by a stressed vowel' (Rudolf E. de Jong, *A Grammar of the Bedouin Dialects of the Northern Sinai Littoral: Bridging the Linguistic Gap between the Eastern and Western Arab World* (Leiden 2000), 61).

⁷⁰ Watson & Bellem, 'Detective Story', and 'Glottalisation and Neutralisation'; Watson, *Structure of Mehri*, 44–6.

⁷¹ Note that *j* here behaves as a stop. It is somewhat variant in realization, often being more palatal than palato-alveolar and subject to lenition (to a fricative or approximant).

⁷² At normal speech speed, particularly in intervocalic position, *k* may be produced without glottalization, in which case it often assimilates ambient voicing from surrounding vowels.

⁷³ Johnstone, 'Modern South Arabian Languages', 98: he notes that for MSAL, 'glottalization in the realization of these consonants seems not to be as strong as in the equivalent consonants in, say, Amharic' and he observes that aspiration seems to be an important distinctive feature in the contrast in MSAL. For acoustic analysis of Tigrinya (Ethio-Semitic) ejectives, see Bellem, 'Emphatics', Chapter 2; see also references therein.

⁷⁴ Johnstone, 'Modern South Arabian Languages', 99 posits the pre-glottalized phonemes 'r and 'l (possibly also 'd); however, the examples he gives are all word-final, following long vowels, and apparently equivalent to the data shown here, in which these sonorants are glottalized in pre-pausal position. There are no examples in this data set, or in any other data set we have seen, of pre-glottalized sonorants in any other context.

⁷⁵ Watson, *Structure of Mehri*, 2.

⁷⁶ Watson, *Structure of Mehri*, 12.

⁷⁷ See Watson, *Structure of Mehri*, 13–14.

⁷⁸ This is discussed in Watson, *Structure of Mehri*, 14.

⁷⁹ Watson, *Structure of Mehri*, 26.

⁸⁰ Data from Watson, *Structure of Mehri*, 29.

⁸¹ However, this diphthongization often fails to occur in the case of a C̄CVVC template where the first C is ‘back’, as in *hīlār* ‘kids’, *hībōl* ‘swellings’, *ḡrōb* ‘sticks’, *xīḡōf* ‘light m.pl.’, *xīḡām* ‘[camel] bridle’, *hīrār* ‘pens for goat kids’. (Watson, *Structure of Mehri*, 30, which cf. for a full discussion of diphthongization in both Mehreyyet and Mahriyōt.)

⁸² Watson, *Structure of Mehri*, 12.

⁸³ There is a physiological reason for *b* being less saliently ejective, or less likely to be released on a glottalic airstream. Since the oral constriction at the lips (as opposed to, say, the velum) creates a comparatively larger closed chamber between the glottal and oral constriction, it is harder to create such a high level of air pressure necessary for the peculiarly ‘sharp’ release typical of ejectives.

⁸⁴ This is from etymological **arayš*.

⁸⁵ Watson, *Structure of Mehri*, 13.

⁸⁶ This is also sometimes called creaky voice, depending on one’s definition. Hayward distinguishes two types of what is called ‘creaky voice’, one which she terms (true) ‘creaky voice’, and one which she terms ‘pressed voice’, which results in ‘a rather more tense quality’ and which is likely to be involved in the production of Mehri *š* (Hayward, *Experimental Phonetics*, 223–4).

⁸⁷ Ejective fricatives are cross-linguistically much rarer than ejective stops or affricates (Ian Maddieson, *Patterns of Sounds* [Cambridge 1984]; Paul D. Fallon, *The Synchronic and Diachronic Phonology of Ejectives* [New York 2002]). As noted in a recent study, ‘The production of an ejective fricative involves an aerodynamic dilemma’, since the increased intraoral air pressure necessary to produce an ejective conflicts with the normal production of a fricative, which involves a continued airflow through the narrowed constriction (Ryan K. Shosted & Sharon Rose, ‘Affricating Ejective Fricatives: The Case of Tigrinya’, *Journal of the International Phonetic Association* 41:1 [2011], 41). Many languages seem to affricate ejective fricatives (as in e.g. Tigrinya).

⁸⁸ Watson, *Structure of Mehri*, 45.

⁸⁹ The negator *lā* most often occurs phrase-finally, and the vowel in this lexeme is generally short.

⁹⁰ Preliminary observations on listening to a number of soundfiles obtained for Jibbālī and Harsūsi are that these also have mixed systems, with pre-pausal glottalization; recent descriptions of Soqōṭri indicate similar (e.g. Lonnet, ‘South Arabian, Modern’; Naumkin & Porkhomovskij, *Očerki po Emolingvistike Sokotry*).

⁹¹ Irene Garbell, ‘“Flat” Words and Syllables in Jewish East New Aramaic of Persian Azerbaijan and the Contiguous Districts (A Problem of Multilingualism)’, in H.B. Rosen (ed.), *Studies in Egyptology and Linguistics in Honour of H.J. Polotsky* (Jerusalem 1964), 86–103, and *The Jewish Neo-Aramaic Dialect of Persian Azerbaijan: Linguistic Analysis and Folkloristic Texts* (The Hague 1965); Robert D. Hoberman, ‘Parameters of Emphasis: Autosegmental Analyses of Pharyngealization in Four Languages’, *Journal of Afroasiatic Languages* 1 (1989), 73–97.

⁹² See Bellem, ‘Emphatics, Triads and Interdentals’ (this volume) for a discussion of this transition and the emphatic trajectory hypothesis.

⁹³ Note, however, that vowel-lowering is reported for schwa preceding pharyngeals and ejectives in the closely related Tigre (F.R. Palmer, ‘Openness in Tigre’, *BSOAS* 18 [1956], 561–77); Sharon Rose (‘Variable Laryngeals and Vowel Lowering’, *Phonology* 13 [1996], 73–117) finds that not just *a* > [a] but also other vowels are lowered and slightly retracted preceding pharyngeals and ejectives. This is not reported for other Ethio-Semitic languages.

⁹⁴ See, for instance, the discussion in Barry Heselwood, ‘Glottal States and Emphasis in Baghdadi and Cairene Arabic: Synchronic and Diachronic Aspects’, *Three Topics in Arabic Phonology* (CMEIS Occasional Paper no. 53, University of Durham 1996), 20–44, on how glottalization may evolve into pharyngealization. He hypothesizes that earlier Semitic emphatics lost their glottalic initiation in some daughter languages, becoming voiced and laryngealized (creaky). They then lost the laryngealized quality since ‘the laryngopharyngeal constriction was then “reanalyzed” as the salient phonetic correlate of emphasis’ (p.27). As discussed in Bellem, ‘Emphatics’, such phonetic realignment would be correlated with a change in the systemic function, or role, of emphatics.